Objectives of research and development:

a. The ultimate objective of Army research and development is to develop weapons, equipment, and techniques for the Department of the Army qualitatively superior to those of any potential enemy, in any environment, and under all conditions of war, thus enabling the Army to carry out is national security missions with maximum effectiveness. Upon their request or at the direction of the Department of Defense, the Army may conduct research and development effort to satisfy requirements of other services or Government agencies.

b. Research and development activities are directed primarily toward---

(1) Developing materiel which satisfies Department of the Army qualitative materiel requirements and small development requirements.

(2) Achieving Department of the Army qualitative materiel development objectives.

(3) Conducting research in areas of promise to the Department of the Army in addition to research and exploratory development conducted in support of its objectives.

(4) Disseminating and using the results of research.

c. Both speed of execution and quality are essential characteristics of Army research and development. Any authorized action should be taken to reduce the time required to satisfy a qualitative materiel requirement. The development leadtime goal is 4 years or less from initiation of development effort in the engineering development/operational system development category to type classification of the item or system as standard. In addition, production engineering and necessary programing, procurement planning, and administrative

Army Declass/Release Instructions on File Declassification/Release Instructions on File

actions should be initiated as early as practicable during the development cycle in order to minimize the time required from type classification to first production folloff.

d. The bulk of research, development, test, and evaluation (RDTE) funds will be spent on items providing real strides forward in terms of combat effectiveness with emphasis on mobility, firepower, and communications. No substantial sums of money will be spent for relatively small increases in terms of combat effectiveness.

e. Unnecessary technical features, over-refinement, and excessive durability must be eliminated. Only those features and characteristics contributing directly to operational capabilities should survive the development process. Incorporation of "nice to have" but nonessential features will be precluded.

f. The costs of new items and modifications to existing items must be carefully weighed against the expected improvement in operational capability. Marginal improvements in the name of modernization will hot be undertaken.

g. Reliability and maintainability will be emphasized in all development programs.

h. Foreign state-of-the-art, trends, and potential threats to present anf future materiel or systems must be considered throughout the research and development cycle to insure the desired level of materiel superiority when released for service use.

i. The potential influence and contributions of national science and technology must be considered throughout the research and development cycle to insure that significant scientific and technological advances are exploited and that materiel objectives and requirements provide the impetus and direction for still greater progress.

Quotations from "Management Informations Systems
and the Computer"
by James B. Gallagher

1. Proper selection and arragement of information for
planning and control is necessary so as to form a system of
reports which will give each manager the key facts to needs
for decisions, underscoring especially the exceptions or
abnormal situations needing his attention. (p. 11)

2. The underlying reason is that not only the systems
planners who design data-processing programs, but also those
who actually manage the systems often prove to be unaware of
the exact needs of management for clear and continuing reports
on the total course of a business. When this kind of failure
occurs, the usual course of d-p personnel is to take refuge
in the preparation of data reports, the expensive and complex
d-p equipment is used almost exclusively for "electronic
record keeping" and the preparation for management of tabula-
ted reports which are in fact only the results of consolidating
"raw data" records without reference to the real needs of
management.

No amount of complex manipulation of simple, raw
data with the aid of electronics can substitute for a care-
fully conceived system of reports to management. (p. 13)

3. A total management information system controlling
the entire business automatically is not in the foreseeable
future, but a system which will keep all the firm's managerial
personnel completely informed of all developments is perfectly
possible of achievement. (p. 16)

The ultimate goal of an effective management informa-
tion system is to keep all levels of management completely
informed on all developments in the business which affect
them. To do this, the d-p personnel and those entering
information into the system should know exactly what data to
collect and which to tabulate, and management on its part
has the obligation to be able to write down its actual require-
ments for internal information. (p. 17)

4. Samuel N. Alexander, Chief of the Data-Processing
Systems Division of the National Bureau of Standards.

"When you enter this area of consideration (determin-
ing the information needs of the organization's entire management)

you find yourself in a ... gray area between the activity
of the office manager or service bureau (data-processing
personnel) and that of the over-all management of the firm.
And while the concept of working backwards from usage
requirement is a natural outgrowth of the integrated approach,
it does raise a number of touchy questions, such as: Why are
the data created in the first place? Who is to use them?
How much of them does he need? When does he need them?
These are the questions which must, sooner or later, be faced
up by the senior management of the firm.... You want the
data that you gather, summarize, and present to be <u>effective</u>;
and it is not sufficient that you handle them for the least
cost--that is, most economically, if you make them serve
non-constructive ends.

 Conflicting personal opinions and interests do more
to hamstring the integrated data-processing approach than
any other factor.

 '... the one thing that ties the areas together in
an efficient unit is the flow of information among these
functions."

 Mr. Alexander put his fingers on the key problems
often encountered by data-processing personnel and systems
designers: reluctance to meet problems of managerial informa-
tion dissemination frankly and fully. (p. 18)

 5. Failure to formalize objectives and establish
definitive policies has many times created problems of
communications and liaison between various levels of manage-
ment and groups charged with systems-data-processing
programs. (p. 25)

 6. Experience indicates that d-p activities generally
involves many phases of a business, cutting across <u>functional</u>
lines and involving the integration of information flow
between these departments. (p. 28)

Research and Development Goals

After considerable thought and discussion, it appears that there are two major areas to consider in order to attempt to provide guidance in the area of research and development for intelligence data handling within the intelligence community. The first concerns the needs of the user. The second concerns the need to control and standardize the operations within an agency and then within the community as a whole.

Within the Army, research and development activities are directed primarily toward satisfying the stated needs of the user. The U. S. Army Combat Developments Command (USACDC) represents the several users of material developed primarily for the Army in the field.

Research and development activities are directed primarily toward:

(1) Developing material which satisfies the Department of the Army Qualitative Material Requirements (QMR) and Small Development Requirements (SDR).

(2) Achieving Department of the Army Quantitative Material Development Objectives (QMDO).

(3) Conducting research in areas of promise to the Department of the Army in addition to research and exploratory development conducted in support of its objectives.

(4) Disseminating and using the results of research.

Enclosed is a copy of AR 705-5, dated 15 October 1964, entitled "Research and Development of Material, Army Research and Development," which explains in detail the Army research and development policies and objectives.

Thus far the undersigned is not aware of any formal documents in the form of QMR's, QMDO's, etc, discussing particular needs for intelligence data handling research and development for the community as a whole. Undoubtedly documentation such as this exists, and an attempt should be made to obtain copies for the team in order to accomplish our mission.

The second major area concerns the need to control and standardize the flow of documents and information through the current operational system. One of the major problems of any large, complex "management information system" is that it tends to expand from within. Systems of this type tend to grow without restraint. The computer has become the master churner. There is a distinct lack of discipline as to what information is to be generated and who is to get what. A tremendous amount of useless, non-relevant information is passed on to people and organizations who do not "need to know." Selective dissemination and positive file maintenance up-dating techniques are paramount if a system is to function efficiently. Proper controls through standardization of data format requirements will result in information being more discriminately and accurately directed to the end user.

The sheer volume of a large information systems complex will tend to bog down operations. More and faster equipment and/or people is not necessarily the solution. The method of operation and the data flow should be examined first before crying out the need for more or new equipment.

Attached are a number of excerpts from "Management Information Systems and the Computer" by James B. Gallagher concerning large management information system. This system closely parallels the probable situation within the intelligence community.

In the absence of known user requirements, the following list of technical areas where research and development efforts can be directed are offered:

1. Visual displays
2. Query-languages into the system
3. Page reading devices
4. Format standardizations
5. Natural language translation
6. Interface data exchange
7. Specialized computer languages
8. Techniques and devices for document storage and retrieval

Within the Army, the U. S. Army Combat Developments Command Intelligence Agency, Fort Holabird, Maryland, should be a good source of data handling needs for the community as a whole.

N. J. Taupeka
March 31, 1965

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Army Research and Development

The regulations, policies, and procedures pertaining to the research and development of material for the U. S. Army are contained in AR-705-5, dated 15 October 1964.

The structure of the Research, Development, Test, and Evaluation (RDTE) program is organized into research and development categories as follows:

      (1) Research

      (2) Exploratory Development

      (3) Advanced Development

      (4) Engineering Development

      (5) Management and Support

      (6) Operational System Development

Each category has a stated level of effort and an expected end result. The bulk of RDTE funds will be spent on items providing real strides forward in terms of combat effectiveness with emphasis on mobility, fire power, and communications.

SYMPOSIUM ON OPTICAL AND ELECTRO-OPTICAL INFORMATION PROCESSING TECHNOLOGY

November 9, 10, 1964

Somerset Hotel, Boston, Massachusetts

ANNOUNCEMENT AND CALL FOR PAPERS

A Symposium on Optical and Electro-Optical Information Processing Technology will be held on Monday and Tuesday, 9 and 10 November 1964. It will be sponsored by the Information Systems Branch of the Office of Naval Research, Greater Boston Chapter of the Association for Computing Machinery, Professional Technical Group on Electronic Computers and Boston Section of the Institute of Electrical and Electronics Engineers, and the New England Section of the Optical Society of America. The Symposium will be held in the Somerset Hotel, Boston, Massachusetts.

The objectives of this Symposium are to promote information exchange between research workers in the field, to focus further attention on the new optical and electro-optical techniques being developed for use in information systems, and to inform those not in this field of research of its future potential. Papers on (1) optical and electro-optical techniques for storage, logic, display, and sensing; (2) recent related device and circuit research on optical generation, detection, modulation, amplification, and control; and (3) recent information processing research including such fields as optical character reading, information retrieval, and digital processing systems.

Although most of the papers will be invited and will be representative of a variety of appropriate research efforts and subjects, some time will be available for delivery of a few particularly significant contributed papers. Any person interested in having a paper considered for inclusion in the Symposium should submit a reasonably extensive and detailed abstract before 13 July 1964, to the address given below.

It is anticipated that formal Symposium Proceedings will be published by MIT Press early in 1965. Attendance at the Symposium itself will be open to all interested technical personnel. Further information and a preliminary program, when available, may be obtained by contacting:

> Mrs. Barbara McKinney
> Computer Associates Inc.
> Lakeside Office Park
> Wakefield, Massachusetts
> Area Code 617   Phone 245-9540

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COSATI Operating Subcommittee

Task Group on Research and Development

in Information Science

A FEDERAL PROGRAM OF RESEARCH

Effective and long lasting solutions to the large

scale information needs of the Federal Government require a

coordinated and unified research and development effort by

the agencies which generate and make use of scientific and

technical information. There is growing recognition that

there are definable generic areas which merit investigation

and which, if resolved, would contribute to the solution of

specific problems of a good many agencies. Since most of

these areas have wide implications, they merit support by a

cooperative program in which the interested agencies can

pool their support of research and development on questions

which are everybody's needs and nobody's exclusive business.

Such a program would seek to tackle important problems in

such a way as to optimize utilization of the Federal research

resources.

The current operational programs of data and infor-

mation handling would proceed as independent programs without

loss of effectiveness or waste in duplication. Further, as

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new and improved techniques are developed and possibly demon-

strated via the coordinated research program, they can be

included in the operational systems at the agency's option,

thus permitting more effective and more comprehensive infor-

mation services to be available for agency use in fulfilling

their particular missions. For example, those agencies whose

major involvement with information technology is represented

by operation of a document dissemination system (the so-called

"book store operations") are, in fact, in the business of

answering scientific and technical questions. Success in the

programs here proposed should greatly aid these agencies in

supplying much needed services to their customers.

A list of research areas that might well form a

basis for discussing a unified program is attached. If the

Task Group can agree that this would form a reasonable basis

for a coordinated effort, the plan should be forwarded via

the Subcommittee on Operations to COSATI. If the program is

subsequently adopted by FCST, the resources of that group

and of the Bureau of the Budget must be marshalled in order

to implement the program. At that time the necessary financial

and program mechanisms must be determined, and selection of

agencies to assume responsibility for the various program

- 3 -

elements must be made. The latter would reflect existing agency missions, interests of their professional staffs and present competence.

A Note on Nomenclature

The existing literature on information science offers difficulties in its interpretation because the language used by the research workers and practitioners in this field has not been standardized. In many instances writers do not define their technical terms, thus placing an added burden on the reader. At least three kinds of problems exist:

1. A term of a certain scope may be used where a broader or narrower term would be more appropriate. Thus, the broad expression "pattern recognition" may be employed in reference to what the surrounding context shows is specifically a print reader.

2. A single term may be used in a variety of ways. For example "associative memory", "indexing", and "search strategy" have each acquired at least three distinct meanings. This problem is particularly important in such situations as that of budget review,

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with respect to imparting a proper under-
standing of a program description.

3.   Not all writers are precise in choice of
verb tenses, the result being that it is
difficult to distinguish work in contem-
plative stages from work in progress or
in an operational phase. This "disease of
the tenses", from which much of the
literature suffers, is important because
considerably more research and development
potential still exists than would be ap-
parent from a face-value interpretation of
research reports.

In view of these language problems, no attempt at
precise definition of terms is being made in the attached list.
However, as the proposed program reaches an active phase, terms
must be clearly defined.

Herbert R. Koller
July 9, 1964

Areas for Initial Coordination

1. <u>Machine translation of human languages</u> (including translation techniques, mathematical linguistics, normalizing grammars.)

2. <u>Linguistic studies</u> (semantics, machine elucidation of meaning, machine indexing, machine abstracting, key-word-in-context indexing, citation indexing.)

3. <u>Remote consoles</u> (for inquiry, input, output; man-machine interaction.)

4. <u>System evaluation</u> (evaluative techniques, systems and sub-systems in operation, standards for appraisal and compatibility.)

5. <u>Classification of knowledge</u> (basic tools for organizing and interrelating conceptual contents of document collections.)

6. <u>Pattern recognition</u> (black and white outline diagrams, gray-scale images, character readers, print readers, speech recognition, electrocardiogram interpretations.)

7. <u>_____ming languages</u> (query, search, data preparation, file maintenance.)

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8. Large file organization and behavior (associative or
   content addressable systems, adaptive and self-
   organizing systems, association trails between
   stored units of information, formal models of file
   structure and behavior).

9. Encoding of information (structured information, e.g.,
   chemical compounds, electronic circuits, hydraulic,
   circuits; non-structured information).

10. Studies of user needs and user interaction with information
    systems.

11. Inputs (offsite facilities processors for data editing,
    compression and transmission, tabular and textual
    inputs, input language control, e.g., thesauri,
    graphical input, i.e., black-white outlines, pictorial
    input, i.e., gray scale and color, analog inputs and
    their sampled data equivalents, e.g., voice or electro-
    cardiogram, automated reading of marks on paper).

12. Outputs (display and other human usable forms, curve drawing
    devices, printers, and other "presentation" devices.)

13. A national information network.